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THE UNEQUAL INEQUALITY IMPACT OF THE COVID-19 PANDEMIC

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GDP contractions are typically associated with within-country income inequality increases. While official income inequality data for 2020 will not be available for about two years, the already available employment data for 2020 shows that the difference between highly-educated and low-educated people in terms of job losses is correlated with the economic shock from the COVID-19 pandemic, suggesting that the depth of the economic recession is related to the increase in within-country income inequality in 2020. Scenarios based on historical patterns of recessions and within-country income inequality increases suggest relatively small increases in global income inequality in 2020. Factors mitigating global inequality increases in 2020 include larger GDP *per-capita* declines in richer advanced countries than in poorer emerging and developing countries, and the positive GDP growth of China, which suggests that within-country inequality in the world's most populous country might have not changed much in 2020. In contrast, it is quite likely there was a significant increase in European Union income inequality in 2020, partly reversing the decline during the previous decades.

JEL codes: C63, D31, D63, O15

Keywords: COVID-19, employment, global distribution of income, income inequality

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1 Introduction

The COVID-19 pandemic has taken millions of lives and resulted in the deepest economic contraction since the second world war. The adverse social consequences, including job losses, have been massive in many countries, even if large-scale government support programmes have dampened the labour market impacts. Lakner *et al* (2021) estimated that the pandemic will push between 143 million and 163 million people globally into extreme poverty between 2019 and 2021, thus reversing the downward trend in global poverty for the first time in a generation[1]. An increase in extreme poverty can widen the gap between the rich and the poor and increase income inequality both within countries and globally.

World Bank (2021) hypothesised that within-country income inequality is likely to worsen because of COVID-19, partly because the pandemic disproportionately impacts the incomes of vulnerable groups, including women, migrant workers and those employed in lower-skilled occupations or informal sectors. Using data from labour force surveys up to the third quarter of 2020, ILO (2021) highlighted the contrast between massive job losses in hard-hit sectors (including accommodation and food services, arts and culture, retail, and construction) and the positive job growth evident in a number of higher-skilled services sectors (including information and communication, and financial and insurance activities). Since average incomes are lower in hard-hit sectors than in higher-skilled sectors, this divergence will tend to increase inequality within countries. Eurofound (2021) studied employment shifts by job–wage quintiles in the European Union from 2019Q2 to 2020Q2 and found that employment changes have monotonically declined along the job-wage distribution, with the largest increase in employment in the best-paid jobs, and with the sharpest losses in the lowest-paid jobs, suggesting widened earnings inequality[2].

Figure 1 shows that in the European Union and in some selected advanced and emerging countries, workers with low educational levels suffered far worse than others in terms of COVID-19 related job losses in 2020. Low-educated people tend to have lower incomes and wealth, and are less able to telework than people with tertiary degrees. Also, a larger share of income comes from wages for lower-educated people than for tertiary-educated people, and thus loss of a job is a bigger income shock for the lower-educated. This divide between the low- and high educated people is visible in the European

[1] Extreme poverty is measured as the number of people living on less than $1.90 per day.
[2] By grouping jobs in the EU according to the wage level, Eurofound (2021, Box 3) found that from 2019Q2 to 2020Q2, 1.3 million net new jobs were created for the best-paid 20 percent of employment (top quintile). For the second best paid 20 percent of earners, 1 million new jobs were created, the middle-paid 20 percent saw 1.1 million lost jobs, the second poorest 20 percent suffered from 2.3 million job losses, while the employment of the least-paid 20 percent (bottom quintile) fell by 3.8 million.

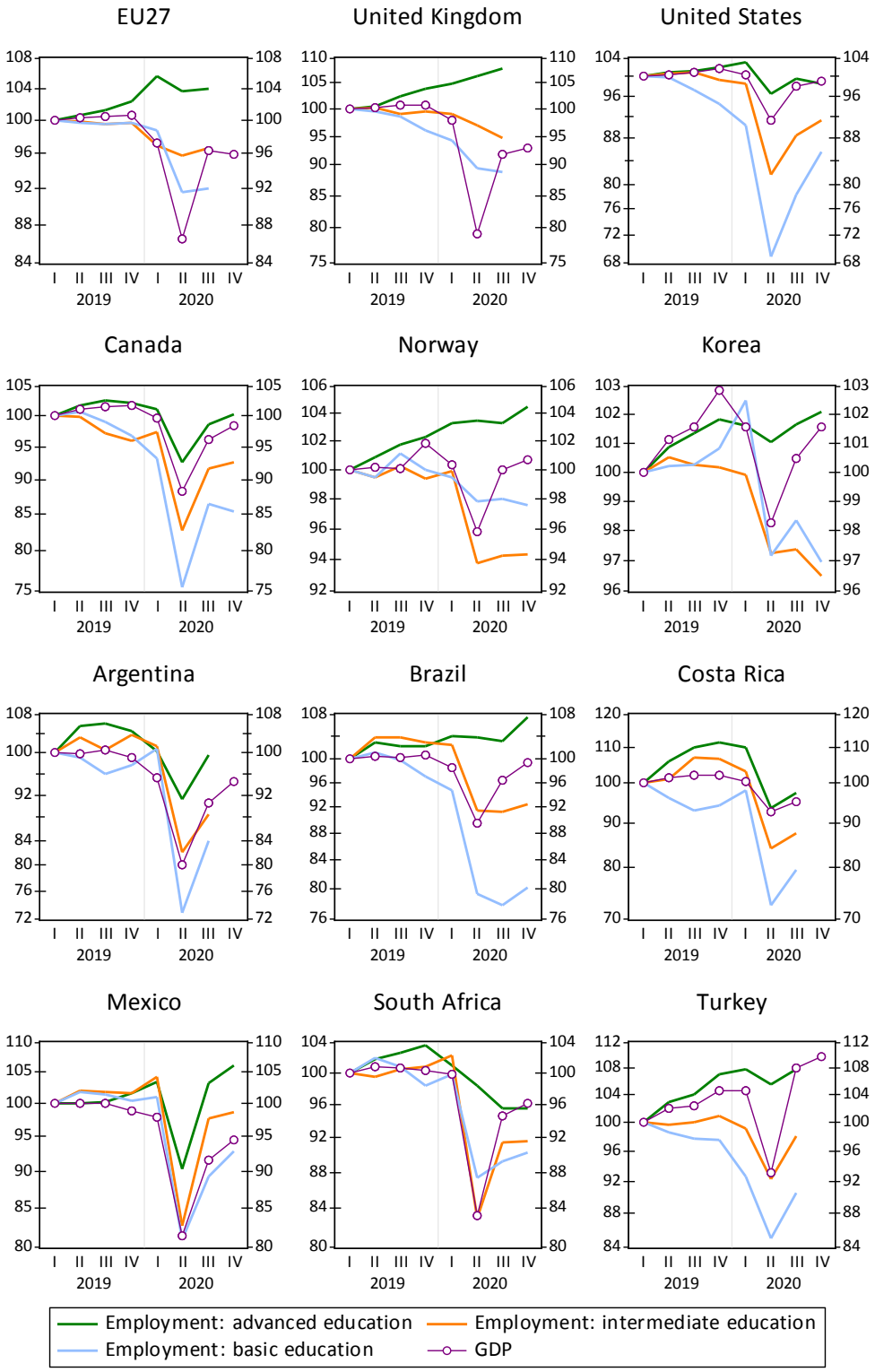
Union too, where governments have put in place massive employment protection programmes (Darvas, 2020). Consequently, the COVID-19 pandemic has increased income inequality between the rich and the poor even in Europe.

But by how much has income inequality increased? Unfortunately, we have to wait for two years until official inequality statistics for 2020 are released. At the time of writing, the European Union's statistical office, Eurostat, has published income inequality data for EU member states and a few other countries[3] up to the 2019 survey year, which refers to income in 2018[4]. The most comprehensive and up-to-date global cross-country income inequality dataset, the Standardized World Income Inequality Dataset (SWIID) of Solt (2020), includes 2019 data for six countries (none of them are EU members), 2018 data for 63 countries (including most EU members), and 2017 data for 90 countries[5]. Its broadest country coverage is for 2007 with data for 181 countries.

Consequently, one can only make estimates of the income inequality impact of COVID-19, until official statistics start to become available in about two years.

[3] http://appsso.eurostat.ec.europa.eu/nui/show.do?lang=en&dataset=ilc_di12.
[4] See https://ec.europa.eu/eurostat/cache/metadata/en/ilc_esms.htm#ref_period1589188882255.
[5] See https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/LM4OWF.

Figure 1: GDP and employment developments in the EU and selected countries, 2019Q1=100



Source: Bruegel based on the International Labour Organisation's "Employment by sex, age and education (thousands)" dataset for seasonally unadjusted employment in all countries; Eurostat's "Employment by sex, occupation and educational attainment level (1 000) [lfsq_egised]" dataset for seasonally unadjusted employment in the EU27; the World Bank's "Global Economic Monitor" for seasonally adjusted GDP data of all countries and Eurostat's "GDP and main components (output, expenditure and income) [namq_10_gdp]" dataset for seasonally adjusted GDP data of the EU; accessed on 25 March 2021. Note: Employment data has been seasonally adjusted.

Some earlier works estimated the income inequality impact of pandemics in general, and the COVID-19 pandemic in particular, but unfortunately, these works suffer from certain weaknesses. Furceri *et al* (2020) estimated the within-country distributional impacts of five major epidemics: SARS in 2003 (27 countries), H1N1 (Swine Flu Influenza) in 2009 (148 countries), MERS in 2012 (22 countries), Ebola in 2014 (5 countries), and Zika in 2016 (18 countries). They constructed a dummy variable, the pandemic event, which takes the value 1 when the World Health Organisation declares a pandemic for the country, and 0 otherwise. This dummy variable was used in an estimated model to study the impact of pandemics on the Gini coefficient of income inequality within countries. They did not control for other factors, such as the global financial crisis that escalated after the collapse of Lehman Brothers in September 2008, though they included country fixed effects (to take account of differences in countries' average income distribution) and time fixed effects (to take account of global shocks).

Unfortunately, their estimate is burdened with a major identification problem: of the total of 220 national cases of pandemic, 148 cases relate to H1N1 in 2009, including practically all advanced countries and most emerging and developing countries. But 2009 was the most severe year of the global financial and economic crisis. The time fixed effects included in the model capture an (unweighted) average GDP change across the approximately 175 countries they consider, but their model implicitly assumes that variation across the average is determined by the incidence of H1N1. But it is implausible, for example, that in 2009 the United States suffered from a larger GDP contraction than the global average because of swine flu. Successive editions of the International Monetary Fund's *World Economic Outlook* do not raise this possibility; rather, they refer to financial shocks and financial vulnerability of the United States, and name the United States as the epicentre of the global financial and economic crisis[6].

This 2009 identification problem could be remedied by leaving the incidence of H1N1 out of the sample period and considering only the four other epidemics when estimating the impacts of epidemics on income inequality. Unfortunately, this option would result in very few available observations. Moreover, the 2020 COVID-19 pandemic was on all accounts much more severe than

[6] The October 2019 *World Economic Outlook* listed swine flu as a risk factor and named only two countries where it exaggerated the economic impact of the global financial crisis: "*The swine flu has compounded the adverse impact of the global recession on Argentina and Mexico. The real GDP growth losses associated with this illness in Mexico are estimated at between ½ and 1 percent in 2009*" (footnote 4 on page 84). The same WEO estimated GDP contraction in Mexico in 2009 at 7.3 percent; thus only about one-tenth of the Mexican GDP contraction in 2009 is estimated to be associated with the swine flu. No such estimate is reported for other countries. The April 2010 WEO did not even mention swine flu or H1N1.

any of these four earlier epidemics, and thus it would be questionable if the results from these earlier epidemics would be relevant to the 2020 COVID-19 pandemic.

When referring to global income inequality, Deaton (2021) looked at the cross-country standard deviation of the logarithm of GDP *per capita*, measured at purchasing power parity. He found that in 2020 this standard deviation went up when countries were weighted according to population size, but went down when each country accounts for one unit. He attributed the increase in the weighted case to the fact that the Chinese economy grew in 2020, while most other countries suffered from GDP declines. This is because the combined populations of those countries with lower average *per-capita* income than China (which is 4.4 billion) exceed the combined populations of those countries that have higher average income than China (2.0 billion), and thus the average income of the 1.4 billion Chinese residents was pulling away from poor countries.

Deaton (2021) noted that the distribution of income between all persons in the world also depends on "*the distribution of income within countries, which is also changing because of the pandemic and the policy response to it*". But he did not aim to estimate the impact of the pandemic on within-country inequality. A proper assessment of global income inequality developments requires the consideration of within-country income distribution changes too.

2 Our approach

Because of the problems of the earlier attempts to estimate the impact of the COVID-19 pandemic on within-country and global income inequality, I adopted a different approach: I set up scenarios for the change in within-country income inequality in 2020 based on GDP change in the same year and then used the methodology from Darvas (2019) to establish scenarios for global and regional income inequality, such as for the European Union.

2.1 Brief literature overview on the distributional impacts of recessions

There is an abundant literature that concludes that recessions tend to have adverse distributional impacts, with poorer people tending to suffer from greater income losses than richer people. For example, Hoynes *et al* (2012) found that in the United States, the impacts of recessions have not been uniform across demographic groups, but have been felt most strongly by men, Black and Hispanic workers, young people, and low-education workers, with impacts remarkably stable over three

decades. Bitler and Hoynes (2015) found that in the Great Recession, the most disadvantaged were relatively more affected (compared to higher income levels). Based on surveys conducted in March and April 2020 in the US, the United Kingdom and Germany, Adams-Prassl *et al* (2020) concluded that the impacts of COVID-19 were highly unequal and exacerbated existing inequalities within countries. By comparing the distributional impacts of the pandemic crisis and those of the global financial crisis, Shibata (2021) found that during both recessions, workers with low earnings suffered more than top earners, suggesting a significant distributional impact of the two recessions.

Thus, recessions tend to have adverse distributional consequences, with the implication that the deeper the recession, the greater its impact in terms of amplifying income inequality. I look first at the historical association between the change in GDP (of a country) and the change in (within-country) income inequality, and then ask if these historical experiences can be relevant for the 2020 pandemic recession.

2.2 Historical association between GDP growth and income inequality changes

I start by estimating the simple regression:

$$\Delta\left(Gini_{i,t}\right) = \alpha + c_i + \tau_t + \beta \cdot Growth_{i,t} + \varepsilon_{i,t}$$

where $\Delta\left(Gini_{i,t}\right)$ is the change of the Gini coefficient of disposable income inequality[7] in country *i* from year *t-1* to year t, $Growth_{i,t}$ is real GDP growth of country *i* from year *t-1* to year *t*, α is a general intercept, c_i is country fixed effects, τ_t is time fixed effects, β is the main coefficient we are interested in, and $\varepsilon_{i,t}$ is the error term. I estimate this model for the full sample and for subsamples of positive growth and negative GDP growth. Country and time fixed effects can control for country- and time-specific developments and thus I estimate a version of the model in which such effects are included.

[7] Note that a higher Gini coefficient of income inequality indicates more inequality, and thus a positive change in the Gini coefficient indicates that income inequality has increased.

Table 1: Panel regression results for income inequality change and economic growth

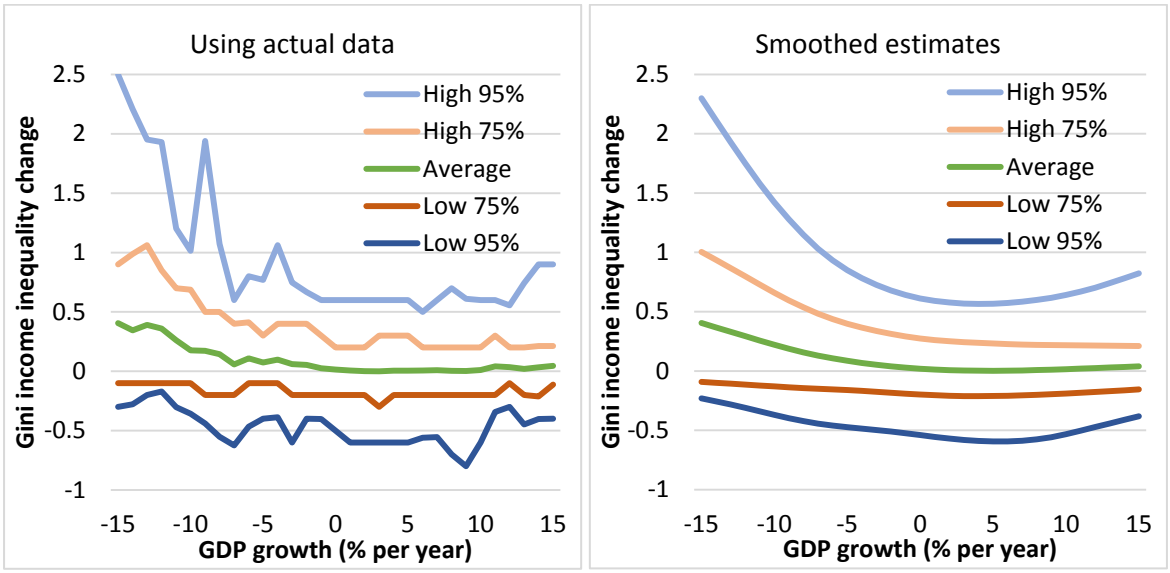
GDP growth	all	positive	negative	all	positive	negative
	No fixed effects			**Country and time fixed effects**		
estimated β parameter	-0.0059	0.0005	-0.0150	-0.0045	-0.0015	-0.0061
s.e.	0.0007	0.0011	0.0021	0.0007	0.0012	0.0024
t	-8.0	0.4	-7.2	-6.2	-1.3	-2.6
p	0.000	0.677	0.000	0.000	0.205	0.010
R2	0.01	0.00	0.06	0.26	0.26	0.54
Cross-sections included	178	178	152	178	178	152
Periods included	59	59	53	59	59	53
Total panel (unbalanced) observations	5346	4584	762	5346	4584	762

Source: Bruegel using Gini coefficients of disposable income inequality from the Standardized World Income Inequality Dataset (SWIID) of Solt (2020) and GDP growth from the October 2020 IMF World Economic Outlook. Note: equation (1) is estimated without (three left data columns) and with (right three data columns) country and time fixed effects, for a sample of 178 countries in 1961-2019. The maximum number of observations would be 178x59=10502, but almost half of observations is missing, mostly in the first half of the sample, but also in the latest few years. s.e.: standard error of the parameter estimate; t: the t-ratio testing the null hypothesis of $\beta = 0$; p: the p-value of the same hypothesis; R2: coefficient of determination.

The full sample estimation reveals a negative association between GDP growth and income inequality change (first data column of Table 1). However, when breaking the sample into two parts, depending on whether growth is positive (second data column) or negative (third data column), only recessions are found to be statistically significantly associated with income inequality changes, while expansions are not. For the recession sample, the estimated β parameter is negative, implying income inequality increases when GDP falls. These results are robust to the inclusion of country and time fixed effects. Such a simple model reveals correlation, not necessarily causality. Nevertheless, the literature summarised in the previous section suggests that recessions cause increases in income inequality, and thus most likely this effect is captured by the regression.

In order to give a more detailed picture of the association between GDP growth and the Gini coefficient of income inequality changes, Figure 2 shows the distribution of income inequality changes for a relatively narrow, +/-1.25 percentage points range, around each GDP growth integer. For example, for zero GDP growth I consider all income inequality changes when GDP growth was between -1.25 and +1.25 for any country in any year, or for -10 percent GDP growth, I consider all income inequality changes when GDP growth was between -11.25 and -8.75. This approach ensures that there are at least 20 observations for the most extreme recession I consider, which is -15 percent. For less-extreme recessions there are more observations. For example, there are 39 observations for a -10 percent contraction, 115 observations for a -5 percent contraction and 631 observations for zero growth. The right panel of Figure 2 presents smoothed estimates.

Figure 2: The empirical association between GDP growth and changes in the Gini coefficient of income inequality, based on data for 182 countries in 1961-2019



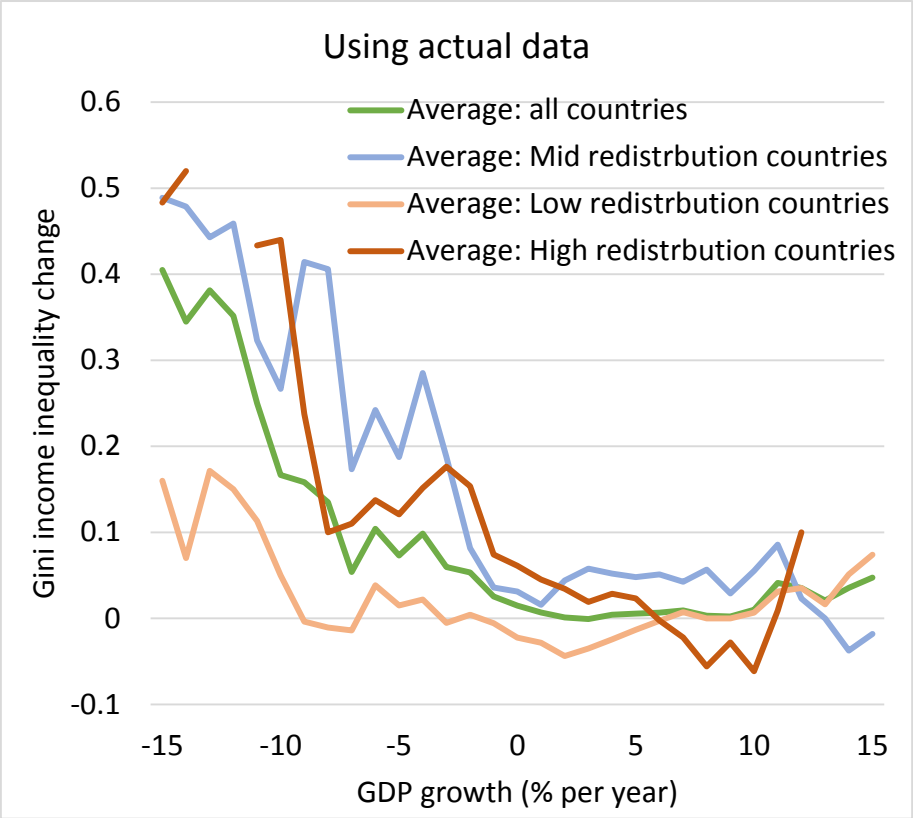
Source: Bruegel. Note: for each integer value of GDP growth, I consider a range of +/- 1.25 percentage points, eg for -10 percent GDP growth I consider all countries and years when GDP growth was in the range of -11.25 percent and -8.75 percent and calculate the distribution of the change in the Gini coefficient of income inequality in these cases. The Gini is measured on a 0-100 scale. The left panel shows results based on actual data, while the right panel shows smoothed estimates. 'High 95%' indicates the upper end of the band that includes 95% of observations, while 'Low 95%' indicates the lower end of this band. Analogously for the band that includes 75% of observations.

Figure 2 confirms the main finding of a non-linear empirical association between GDP growth and income inequality changes, as revealed by the regression results reported in Table 1. When GDP growth is positive, the average change in the Gini coefficient of income inequality is practically zero and the 75 percent interval is symmetric around zero. But when GDP growth is negative, a deeper recession is associated with a larger increase in income inequality on average, and most of the probability intervals turn positive. Even if the probability intervals include zero, it is clearly visible that all moments of the distribution become more positive for deeper recessions. Moreover, the regression results reported in Table 1 confirmed that there is statistically highly significant association between the two variables when I restrict the sample to negative GDP growth cases, but practically zero and statistically insignificant association when I restrict the sample to cases of positive GDP growth.

As a robustness analysis, I separated countries into three groups according to the degree of redistribution, measured as the difference between market and disposable income Gini coefficient of income inequity. I divided the range of the highest and lowest redistribution values into three equal sub-ranges and classified countries as 'low', 'mid' and 'high' redistribution, depending on which range their redistribution falls into. There are 35 countries in the high-redistribution group (including 24 European Union countries, Australia, Canada, Iceland, Israel, New Zealand, Norway, some Balkan

countries and the United Kingdom), 32 in the mid-redistribution group (including Bulgaria, Latvia, Romania, Russia, Switzerland, the United States, and several Latin American countries) and 115 countries in the low-redistribution group. By creating three groups, the number of observations for each group can be low at the tails. Therefore, I cannot calculate proper probability bands and thus show only average values, provided there are at least five observations for a particular GDP change value. Figure 3 shows that the tendency is similar in all three groups: positive GDP growth is associated with close to zero average change in the Gini coefficient, while GDP falls are associated with increased income inequality in all three groups; more so in the mid- and high-redistribution groups than in the low-redistribution group.

Figure 3: The empirical association between GDP growth and changes in the Gini coefficient of income inequality, based on data for 182 countries in 1961-2019, by the degree of redistribution



Source: Bruegel. Note: see the explanation in the note to Figure 2. Countries are sorted into 'low', 'mid' and 'high' redistribution groups according to their average difference in market and disposable income Gini coefficient of income inequity. The range of the highest and lowest redistribution values is divided into three equal sub-ranges. There are 115 countries in the low-redistribution group, 32 in the mid-redistribution group and 35 in the high-redistribution group.

2.3 Was the 2020 pandemic recession different?

Governments typically respond to recessions with fiscal measures. This was the case in 2020, when the extraordinarily deep recession was followed by extraordinarily large fiscal responses in several countries. However, because of some special features of the COVID-19 pandemic recession that I discuss below, the association between GDP contraction and income inequality change could be different this time, compared to previous recessions.

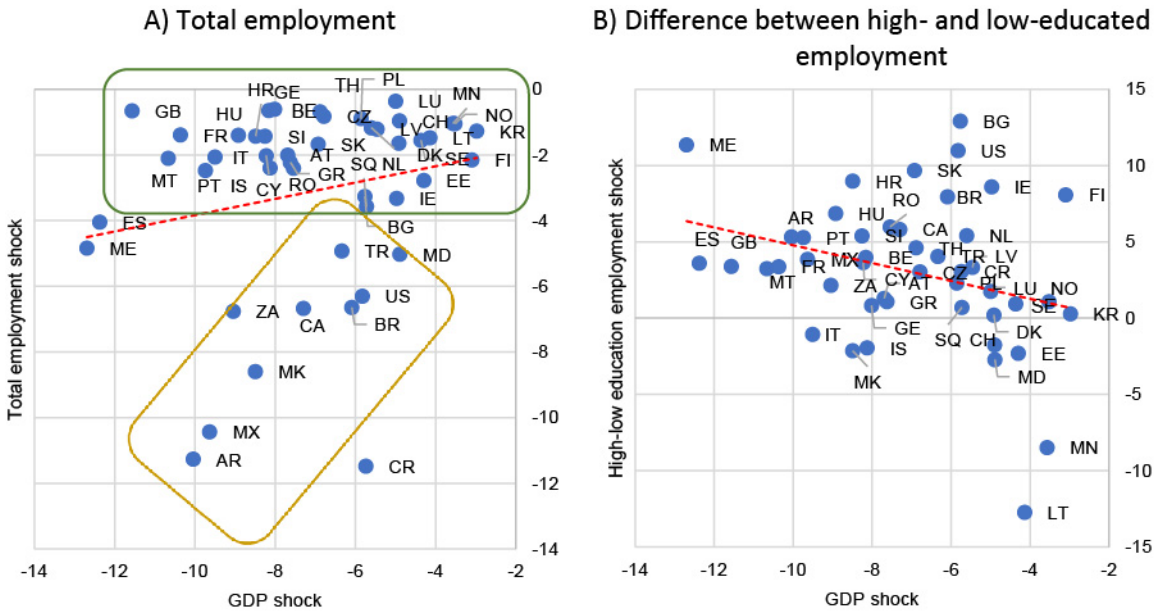
The aggregate employment impact, which does not include much information about distributional issues, is reported in Figure 4, Panel A. Data for 49 developed and emerging countries shows that the shock to GDP and the shock to total employment from 2019Q4 to 2020Q2 is not much related. Since there were visible pre-pandemic trends in GDP and employment (see also Figure 1), I calculated the shock as the average quarterly change from 2019Q4 to 2020Q2 minus the average quarterly change from 2016Q4 to 2019Q4, based on seasonally adjusted data. While there is a slight positive association in the full sample of 49 countries, the correlation coefficient, 0.21, is statistically significantly different from zero only at the 16 percent level of significance, and the chart suggests two distinct groups. In one group, highlighted by a green rectangle, there is practically no association between the GDP shock and the total employment shock. Most European Union countries, the United Kingdom, Norway, Iceland, Switzerland, Korea, Mongolia, Serbia and Thailand belong to this group. In the other group, highlighted by a brown rectangle, there is a clear positive association, with a larger GDP shock associated with a larger total employment shock. Also, for a similarly sized GDP shock, the employment contraction was much larger in this second group than in the first group. The United States, Canada, South Africa and a couple of Latin American countries belong to this second group. Since most first-group countries adopted large-scale employment protection programmes, most likely these programmes dampened the aggregate labour market impact of the pandemic recession.

However, even in Europe, the GDP shock is associated with the differential labour market impact of high-educated and low-educated workers (Figure 4, Panel B). The more negative the GDP shock, the larger the difference between the change in the employment of high-educated workers relative to low-educated workers. The correlation coefficient is -0.30 with a t-ratio of -2.08, which is statistically different from zero at the 5 percent level.

There are outliers to this association. For example, while the GDP shock was similar in the United States, Bulgaria and Czechia, the low-educated suffered much more than the high-educated in Bulgaria and the US than in Czechia. Or though Italy and France suffered from a similar GDP shock, in Italy the

low-educated workers have in fact suffered slightly less than the high-educated, while French developments fit well with the trendline observed for other countries. Notwithstanding such outliers, the negative correlation suggests that GDP and income inequality changes in 2020 are likely correlated, even if there were massive employment-protection programmes in Europe.

Figure 4: GDP and employment shock from 2019Q4 to 2020Q2



Source: Bruegel using data sources listed for Figure 1. Note: the shock is defined as the difference between the average quarterly change from 2019Q4 to 2020Q2 minus the average quarterly change from 2016Q4 to 2019Q4, based on seasonally adjusted data. For the right panel, I calculate the shocks in high-educated and low-educated workers separately and then plot the difference between these two shocks as a function of the GDP shock.

A number of factors suggest that the inequality increase could be sharper in 2020 than in earlier recessions:

- Adverse feedback via health: compared to richer people, poorer people suffer more from health conditions and live in smaller dwellings in more densely populated areas, where self-isolation and respecting social distancing rules is more difficult. Research using data from 80 countries in January-May 2020 found that socioeconomic circumstances have a strong negative association with COVID-19 confirmed cases and deaths per million people (Ashraf, 2020). An analysis of a unique US dataset revealed that that people with lower incomes, an inability to tele-work and lack of outside space at home are less likely to engage in behaviours, such as social distancing, that limit the spread of disease (Papageorge *et al*, 2020). Public Health England (2020) showed that in England, the incidence of COVID-19 infections (measured as the weekly case rate per 100,000 population in the respective population group) is highest for the most deprived people, identified

by an index of multiple deprivation. Thus, poorer people are more vulnerable to COVID-19 and an eventual infection can adversely impact their health, life and income.

- Differences in teleworking ability: poor people are less in a position to telework and there is evidence from the US showing that this was a major factor in job losses, both in industries heavily exposed to COVID-19 and in less-exposed industries (Dey *et al*, 2020).
- Differentiated sectoral impacts: while recessions typically have differentiated sectoral impacts and construction (a sector dominated by low-income workers) is often hard hit, the 2020 recession harshly hit sectors (eg restaurants and bars, travel and transportation, entertainment, hairdressers, retail stores) dominated by low-income workers.

2.4 National income inequality scenarios for 2020

For the reasons discussed in the previous section, I expect that for each particular GDP contraction value, income inequality increased more in 2020 than in earlier recessions.

I consider four scenarios of national inequality changes in 2020:

- Scenario 1: No change in national inequality. This is perhaps an unrealistic scenario for many countries, because existing labour market data already suggests widening gaps between the richer highly-educated and the poorer low-educated workers. Nevertheless, this scenario can serve as a benchmark against which other scenarios can be compared. When I calculate global income inequality, this scenario shows the impacts of between-country inequality and the changes in relative population sizes[8].
- Scenario 2: National inequality changes according to the average historical association between GDP growth and inequality changes, as reflected by the green line in the right panel of Figure 2.
- Scenario 3: National inequality changes according to the upper end of the 75 percent interval for the historical association between GDP growth and inequality changes, as reflected by the orange line in the right panel of Figure 2.
- Scenario 4: National inequality changes according to the upper end of the 95 percent interval for the historical association between GDP growth and inequality changes, as reflected by the light blue line in the right panel of Figure 2.

[8] The change in global income inequality can be decomposed into three components: (1) within-country inequality, such changes resulting from the variation in national Gini coefficient of income inequality, (2) between-country inequality, reflecting changes in mean incomes, and (3) changes in the relative population size of countries. The literature mostly focuses on (1) and (2), yet the third component is also relevant. For example, if within-country inequality and mean income does not change in any country, but population growth is faster in poorer countries, then global inequality goes up.

If the adverse distributional impact of COVID was harsher than what was observed on average after previous recessions (Scenario 2), then the open question is if Scenario 3, or Scenario 4, or an even more extreme scenario could be more realistic. In any case, our scenarios can serve as the basis to assess further alternative scenarios of national inequality and their consequences for global and European income inequality.

2.5 Income inequality assumptions for 2018-2019

The global income inequality dataset[9] of Darvas (2019), which considers 145 countries that account for 96 percent of the global population, is available up to 2017. For the year 2017, it is based on actual income inequality data for 81 countries (including the most populous country, China) and approximated values for 65 countries. For 2018 and 2019, I used national inequality data when available (60 countries for 2018 and six countries for 2019) and assumed unchanged national inequality when data was not available.

The assumption of unchanged national inequality (when data was not available) for 2018-2019 is less restrictive because there were no big shocks in 2018-2019, and income inequality typically changes little in such years. Of the 60 countries for which 2018 data was available, there was no change in the Gini coefficient in 25 countries, only a 0.1-point increase in 10 countries and only a 0.1-point decline in 18 countries. The largest decline was 0.4 points in two countries, while the largest increase was 0.3 points in two other countries. Thus, there were no or generally minor changes in income inequality in those 60 countries for which data was available for 2018, so it looks safe to assume that there was no change in inequality in countries for which 2018 and 2019 data is not available.

2.6 GDP and population assumptions

GDP *per capita* at purchasing power parity and population data are from the October 2020 IMF *World Economic Outlook* dataset. By definition, this dataset includes forecasts for 2020, yet since these forecasts were made in the autumn of the year, the forecast error is likely to be small.

[9] See https://www.bruegel.org/publications/datasets/global-and-regional-gini-coefficients/.

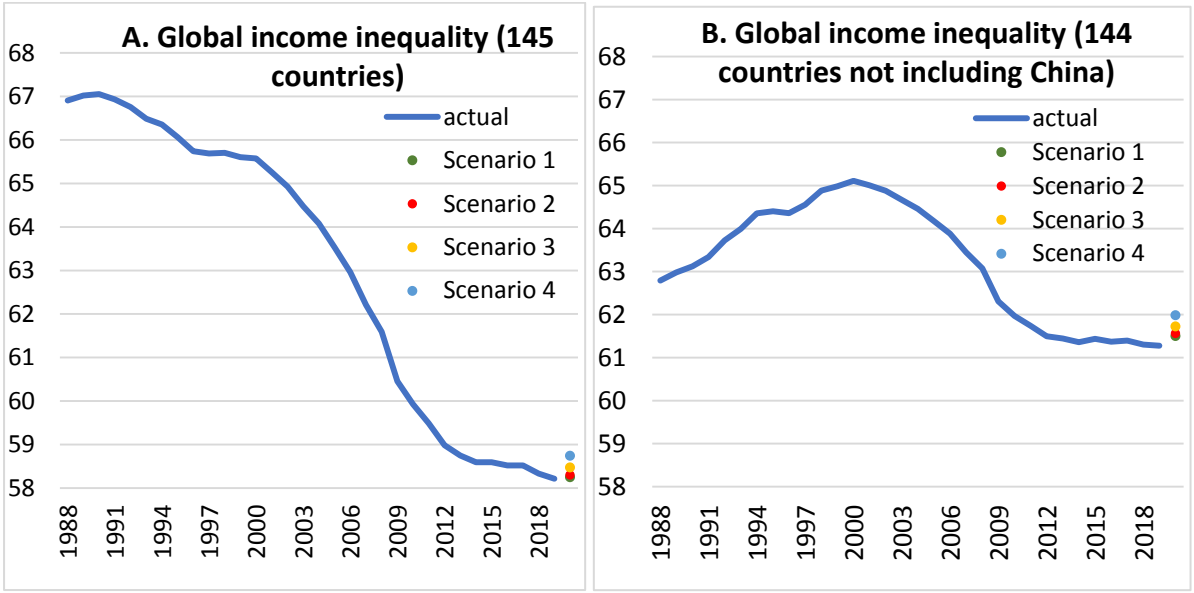
3 Results

3.1 Global income inequality

Global income inequality declined steadily after 1990 (Panel A of Figure 5). The decline was especially rapid between 2000 and 2014, largely thanks to rapid average income growth in China and India (Darvas, 2019). For 2020, scenarios 1 and 2 would lead to minor increases in global inequality, while scenario 3 would put global inequality back to its 2017 level and scenario 4 would increase global inequality to its 2013 level. Nevertheless, even the increase under scenario 4 does not look dramatic when considering the large decline from 1990 to 2013.

A possible explanation for the muted global income inequality increase is that GDP contraction in 2020 was higher in richer advanced countries (estimated at -5.8 percent by the October 2020 IMF *World Economic Outlook*) than in poorer emerging and developing countries (estimated at -3.3 percent by the same IMF report), and thus between-country income inequality has declined.

Figure 5: Scenarios for global disposable income inequality developments



Sources: Bruegel. 1988-2017 data is from Bruegel's 'Global and regional Gini coefficients' dataset. 2018-2020 estimates use the same methodology than what is used for the dataset. For 2018 and 2019, I use national inequality data when available (60 countries for 2018 and 6 countries for 2019) and assume unchanged national inequality when data is not available. Scenarios for 2020: 1: unchanged national inequality, 2, 3 and 4: national inequality changes according to smoothed estimate for the historical association between GDP growth and inequality changes considering the average (scenario 2), the upper end of the 75% interval (scenario 3) and the upper end of the 95% interval (scenario 4). GDP and population data are from the October 2020 IMF *World Economic Outlook* dataset. Global calculations consider 145 countries in the full period. Note: the Gini coefficient of income inequality is measured on a 0-100 scale.

Since China did not suffer from a recession in 2020, it is interesting to study global income inequality when China is excluded[10]. For 2020, my calculations do not support the hypothesis of Deaton (2021) suggesting that Chinese growth developments increased global income inequality. When looking at Scenario 1 (unchanged national income inequality in 2020 compared to 2019, and thus only changes in relative mean incomes and relative populations drive global income inequality changes), the change in global Gini is 0.03 when China is included and 0.22 when China is excluded (note that the Gini coefficient is measured on a 0-100 scale). Thus, the rise in global income inequality is smaller when China is included, suggesting that Chinese growth and relative population change dampened the rise in global income inequality.

Chinese developments further dampen the increase in global income inequality when we consider changes in within-country inequality (scenarios 2, 3 and 4). Since GDP growth of 1.9 percent is expected in China in 2020, according to the October 2020 IMF *World Economic Outlook*, under the empirical association revealed in Figure 2, Chinese national income inequality is not expected to increase in Scenario 2, while the increase in Scenario 3 is just 0.25 Gini points, and 0.57 Gini points in Scenario 4. Since most countries suffered from a recession in 2020, their within-country income inequality is expected to increase more than in China in 2020. Thus, the likely relatively small within-country income inequality increase in China mitigated the global income inequality rise in 2020. In Scenarios 2, 3 and 4, global income inequality is expected to increase by 0.08, 0.25 and 0.51 Gini points, respectively, when China is included, and 0.28, 0.44 and 0.71 Gini points, respectively, when China is excluded, highlighting that Chinese developments mitigated the increase in global income inequality in 2020 under all four scenarios.

Figure 6 reports what shares of the populations of selected countries belong to the five quintiles of global income distribution, under the four scenarios. China clearly moved up in the global distribution from 2019 to 2020: the share of Chinese people belonging to the poorest 60 percent of world population is set to decline under all four scenarios, and consequently, the share of Chinese people belonging to the richest 40 percent of world population is set to increase. This development is driven by the 2020 economic growth in China (lifting average income in the country compared to the rest of the world), but also by small increases in within-China income inequality under the scenarios. On the

[10] A comparison of Panels A and B of Figure 5 shows that China had a major influence on global income inequality dynamics from 1988 to the early 2010s. Without China (Figure 5, Panel B), global income inequality increased up to 2000 and the decline after that was slower than in the full sample including China (Figure 5, Panel A). India also had a decisive role in the development of global income inequality. Darvas (2019) showed that when both China and India are excluded, global income inequality was higher in 2015 than in 1988.

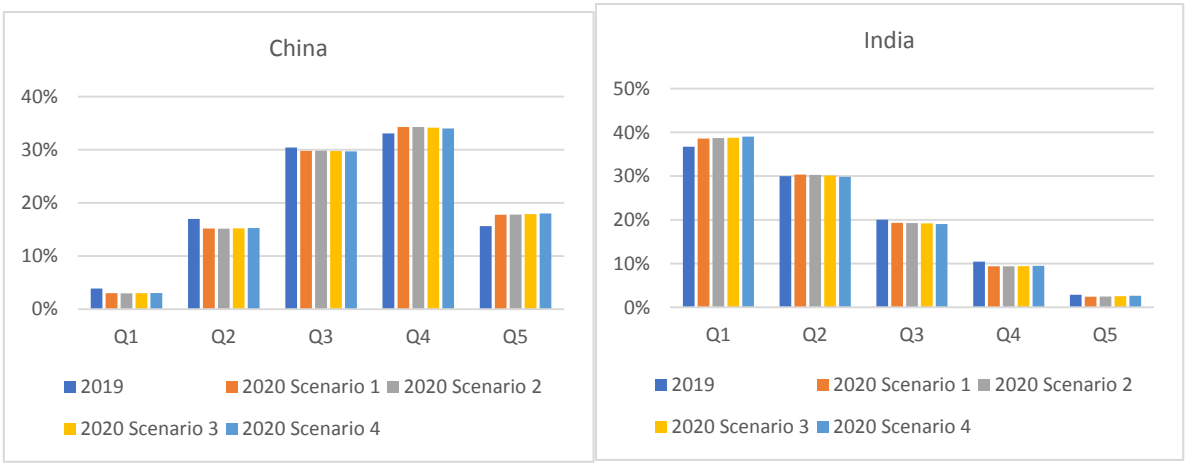
contrary, the Indian population is expected to slide back in the global income distribution, because of the expected 10 percent GDP fall in 2020 and the consequent within-India income inequality increase.

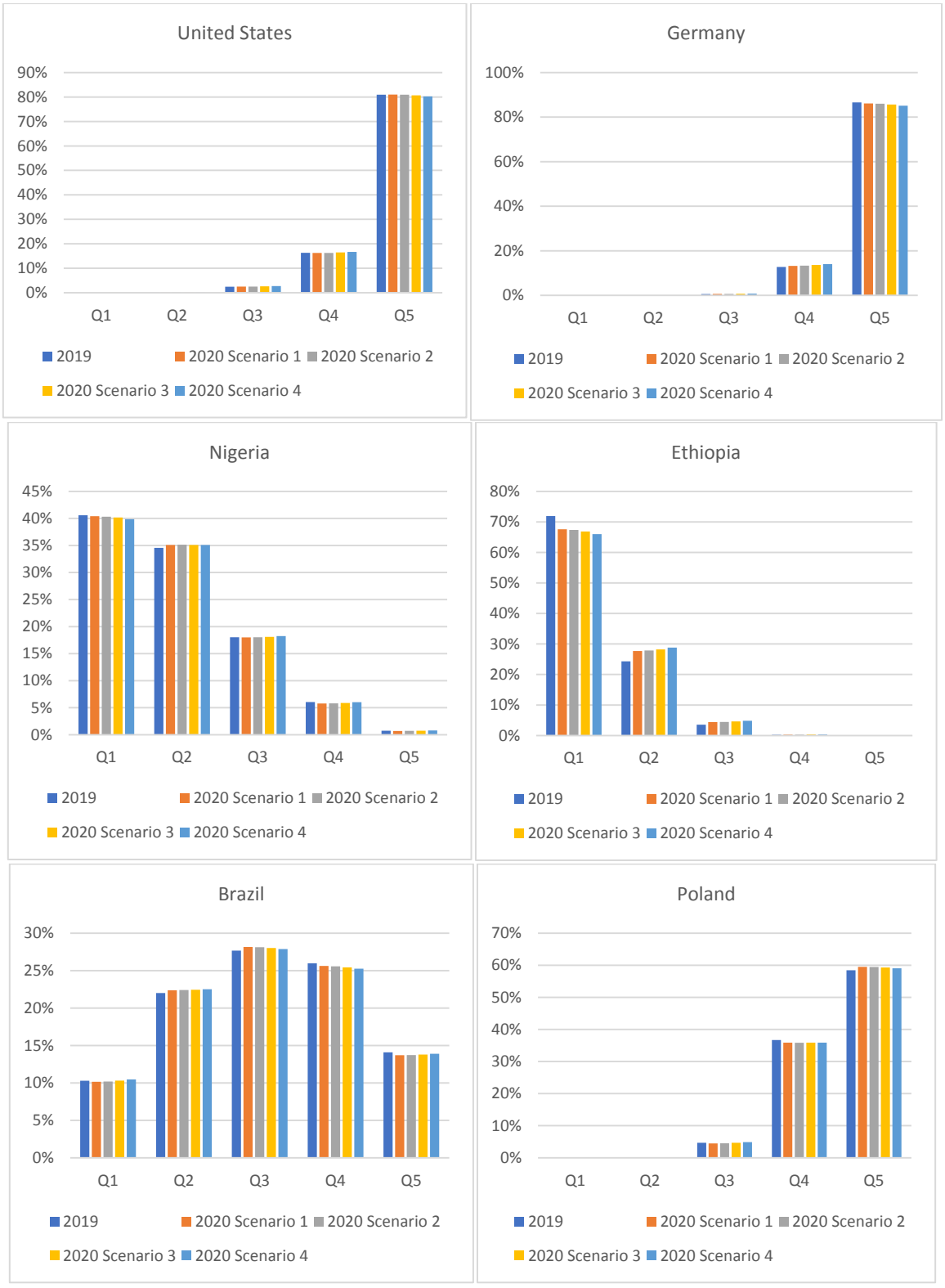
The bulk of the population of advanced countries belongs to the richest 20 percent of the world. Scenario 1 (unchanged within-country income inequality in 2020) would slightly raise the share of US population in the top quintile from 80.9 percent to 81.0 percent, while scenario 4 would reduce this share to 80.3 percent. Germany is expected to suffer from a larger GDP decline than the US and thus the share of its population belonging to the top world income quintile is set to decline under all four scenarios.

Among the two most populous African countries, Nigeria's citizens are expected to marginally move up the global income ladder (reduced share in the first quintile and increased share in the second quintile), while Ethiopia's gain is more significant, mainly because Ethiopia also belongs to the lucky group of counties that was able to avoid a recession in 2020.

Finally, among the two emerging countries considered, Brazil is slightly falling back in the global income distribution, while Poland is forging ahead.

Figure 6: Population share in the quintiles of the global disposable income distribution, selected countries, 2019-2020



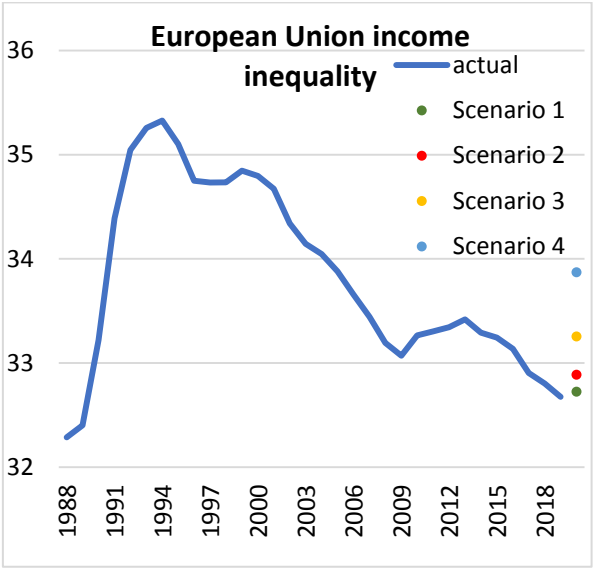


Source: Bruegel. Note: quintiles are ranked from the bottom quintile (Q1: 20 percent of world population with the lowest incomes) to the top quintile (Q5: 20 percent of world population with the highest incomes).

3.2 European Union income inequality

Figure 7 shows that income inequity in the combined group of European Union members (28 countries including the UK) increased significantly from 1988 to 1993, largely because of significant economic contractions in former socialist countries (Darvas, 2016). There was a steady decline from 1994 to 2009, followed by a reversal after the global and euro-area economic crises in 2008-2012. Inequality decline then resumed after 2013. 2020 will likely mark a significant turnaround. GDP is expected to contract between 2 percent and 13 percent in EU countries in 2020 and the associated disproportionate employment and income declines (as discussed in section 2.3) have likely boosted income inequality. Scenario 2 would undo European inequality declines of the preceding three years, Scenario 3 would undo five years' worth, while Scenario 4 would undo 14 years of inequality declines, raising the level of European inequality back to where it was in 2005.

Figure 7: Scenarios for European disposable income inequality developments



Source: Bruegel. 1988-2017 data are from Bruegel's 'Global and regional Gini coefficients' dataset. 2018-2020 estimates use the same methodology than what is used for the dataset. For 2018 and 2019, I use national inequality data when available (60 countries for 2018 and 6 countries for 2019) and assume unchanged national inequality when data is not available. Scenarios for 2020: 1: unchanged national inequality, 2, 3 and 4: national inequality changes according to smoothed estimate for the historical association between GDP growth and inequality changes considering the average (scenario 2), the upper end of the 75% interval (scenario 3) and the upper end of the 95% interval (scenario 4). GDP and population data are from the October 2020 IMF *World Economic Outlook* dataset. Calculations for the EU consider the first 28 member states in the full period. Note: the Gini coefficient of income inequality is measured on a 0-100 scale.

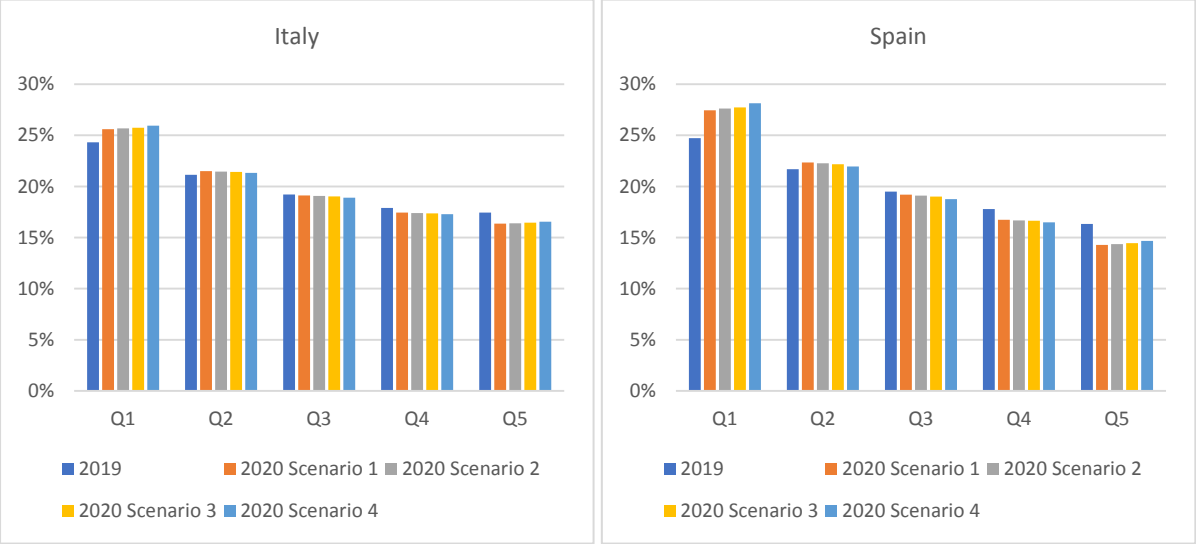
Two large EU countries, Italy and Spain, where average income is below the European average, faced deeper recessions in 2020 than Germany, the largest EU country. This led to wider between-country differences in mean incomes in 2020, a factor further amplifying European income inequality. Thus, in

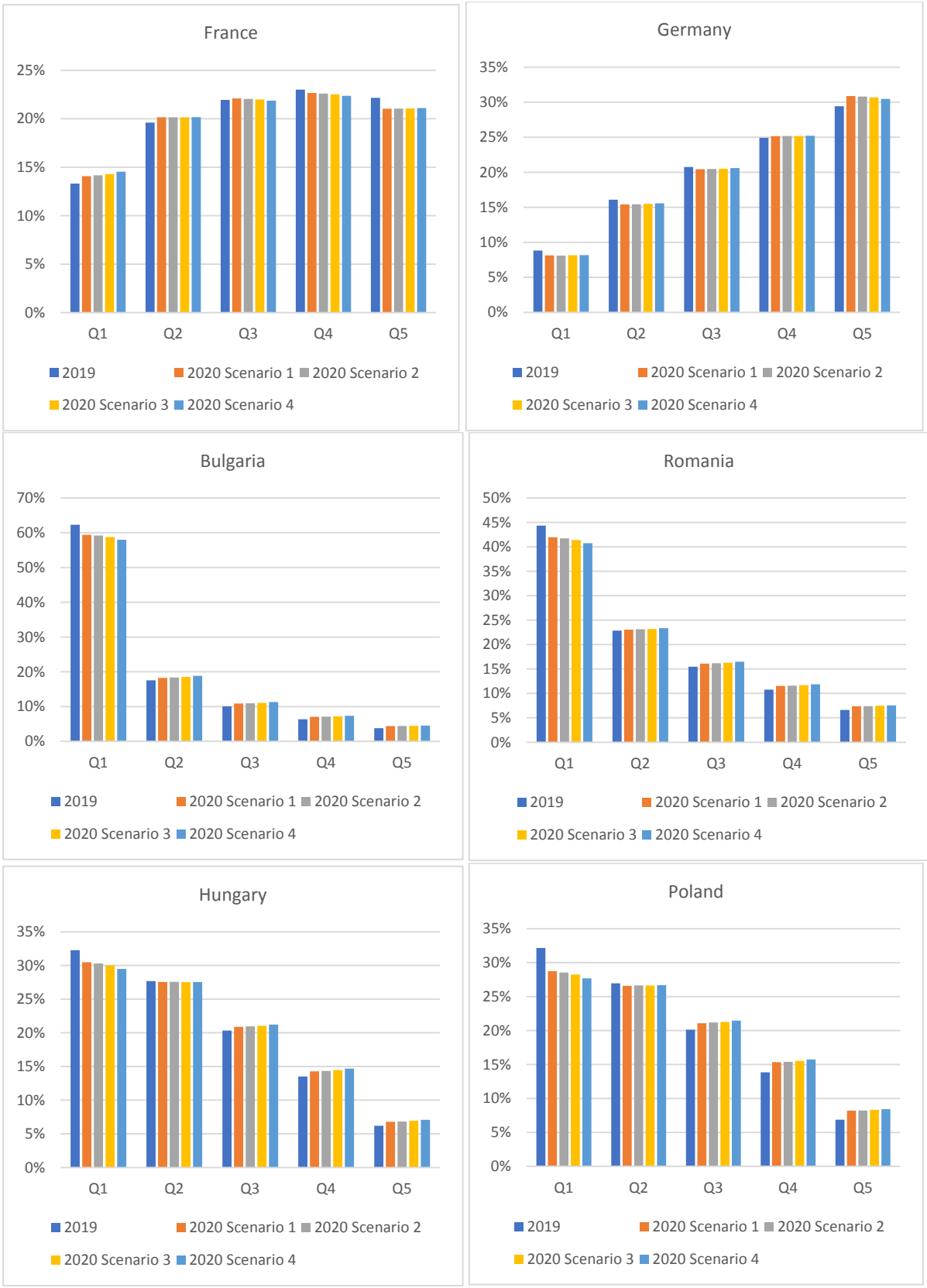
Europe, the 2020 pandemic-induced recession likely resulted in a significant reversal of pre-pandemic inequality declines.

The falling behind of the Italian and Spanish populations in the European income distribution is visible in the increased shares of these populations belonging to the bottom 40 percent of the European income distribution, while Germans increased their share in the top 40 percent (Figure 8). Thus, Germany's position in the global (Figure 6) and European (Figure 8) income distributions moved the opposite way.

France, the second most populous European country, also faced a larger than average GDP decline in 2020, and thus its population is also sliding back. The combined population of Italy, Spain and France is much larger than Germany's population, so a falling behind of the former three countries must imply that other nations forge ahead beyond Germany. Figure 8 shows that four central European countries are improving their positions, partly because their economic contractions were not so harsh in2020: -4 percent in Bulgaria and Poland, -5 percent in Romania and -6 percent in Hungary.

Figure 8: Population share in the quintiles of the EU28 disposable income distribution, selected countries, 2019-2020





Source: Bruegel. Note: quintiles are ranked from the bottom quintile (Q1: 20 percent of world population with the lowest incomes) to the top quintile (Q5: 20 percent of world population with the highest incomes).

4 Conclusions

Past recessions have been associated with income inequality increases. The COVID-19 pandemic and its economic fallout have likely had the same effect. I found, using data from 49 advanced and emerging countries, that the difference between the job losses experienced by richer highly-educated and poorer low-educated workers is correlated with the economic shock in 2020, suggesting that the depth of the economic recession is related to the increase in within-country income inequity in 2020. These findings are consistent with earlier results from the literature documenting the adverse distributional impacts of recessions. A specific feature of the policy response to COVID-19 was the implementation of large-scale employment-protection schemes, especially in Europe. These schemes have likely contained the total employment decline, but not its adverse distributional implications. The COVID-19 recession has had some specific characteristics, including adverse feedbacks via health, the importance of teleworking and differences in the ability of different segments of the society to telework, and differentiated sectoral impacts. These suggest that adverse distributional impacts in 2020 were greater than in previous recessions.

I set up scenarios based on historical patterns of recessions and income inequality increases and argued that in the 2020 pandemic recession, the income inequality increases from a given GDP shock were likely larger than in historical recessions. The scenarios suggest that there was a reversal to pre-COVID-19 global inequality levels in 2020, but this reversal was relatively minor. Factors dampening the global income inequality increase in 2020 included larger GDP declines in richer advanced countries than in poorer emerging and developing countries, and the positive GDP growth of China in 2020. In contrast, it is quite likely there was a significant increase in European income inequality in 2020.

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